4. Evaluation of Existing Conditions: All Study Corridors

Vehicular Traffic

Level of Service Analysis and Methodology

The operation of signalized intersections within the study area was analyzed applying the methodologies presented in the 2000 *Highway Capacity Manual* (HCM2000). These procedures evaluate signalized intersections for average delay per vehicle and level of service (LOS).

Signalized Intersections

The capacity analysis methodology separates an intersection approach into lane groups on the basis of the movements occurring during each signal phase. The lane groups are then analyzed to determine the specific vehicular capacity and LOS. This analysis requires the following input parameters: intersection geometry, lane utilization, number of travel lanes, width of travel lanes, on-street parking conditions, locations of bus stops, number of buses stopping per hour, vehicle turning movements, vehicle classification, conflicting pedestrian movements, traffic signal cycle length, and allocation of green time.

The operating characteristics of signalized intersections can be estimated and evaluated by analyzing capacity and performance. The capacity of an intersection represents the throughput of a facility (i.e., the maximum number of vehicles that can be served in one hour). The capacity analysis results in a volume-to-capacity ratio (v/c ratio) which presents the proportion of capacity (supply) utilized by the existing traffic volume (demand). High v/c ratios (>0.85) indicate some traffic congestion, and low v/c ratios (<0.60) indicate smooth traffic flow.

The performance of an intersection is based on the estimated average delay time (i.e., the average stopped time per vehicle) for each vehicle utilizing a roadway segment. Delay time is determined by the capacity of a lane group, the amount of green time allotted to a lane group, and the signal cycle length. Delay time is the factor which determines the LOS for a lane group.

Short delays receive a good LOS while long delays receive a poor LOS. For example, an average delay of up to ten seconds per vehicle corresponds to LOS A, while an average delay of 45 seconds corresponds to LOS D. Table 4.1 describes the LOS definitions for signalized intersections, and Table 4.2 describes the LOS definitions for un-signalized intersections.

Table 4.1
Level of Service Definitions for Signalized Intersections

Flow Quality	Description
Level A	Describes operation with very low delay, i.e., less than or equal to 10 seconds per vehicle. This occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
Level B	Describes operation with delay in the range of >10-20 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
Level C	Describes operation with delay in the range of >20-35 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although some may still pass through the intersection without stopping.
Level D	Describes operation with delay in the range of >35-55 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, longer cycle lengths, or high v/c ratios. Many vehicles stop and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
Level E	Describes operation with delay in the range of >55-80 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.
Level F	Describes operation with delay in excess of 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with saturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.
Source: *Highway Capacity Manual*, Transportation Research Board, National Research Council, Washington, D.C., 2000	

Table 4.2
Level of Service Definitions for Unsignalized Intersections

Level of Service	Control Delay (sec/veh)
A	0-10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	>50

Intersection Analysis

Two intersections were selected for analysis along each of the three study corridors. Along Middletown Road the intersections selected were Crosby Avenue, which is signalized and Robertson Place, which is un-signalized. Along East 228th Street and East 229th Street the intersections selected were White Plains Road and Laconia Avenue, both of which are signalized. Along Mosholu Avenue and West 254th Street the intersections selected were Fieldston Road and Riverdale Avenue, both of which are signalized. Figures 4.1, 4.2 and 4.3 illustrate the locations of these selected intersections along the study corridors. Three time periods during the weekday were analyzed for this study, 7:00 AM to 9:00 AM, 12:00 PM to 2:00 PM, and 4:00 PM to 6:00 PM.

Figure 4.1

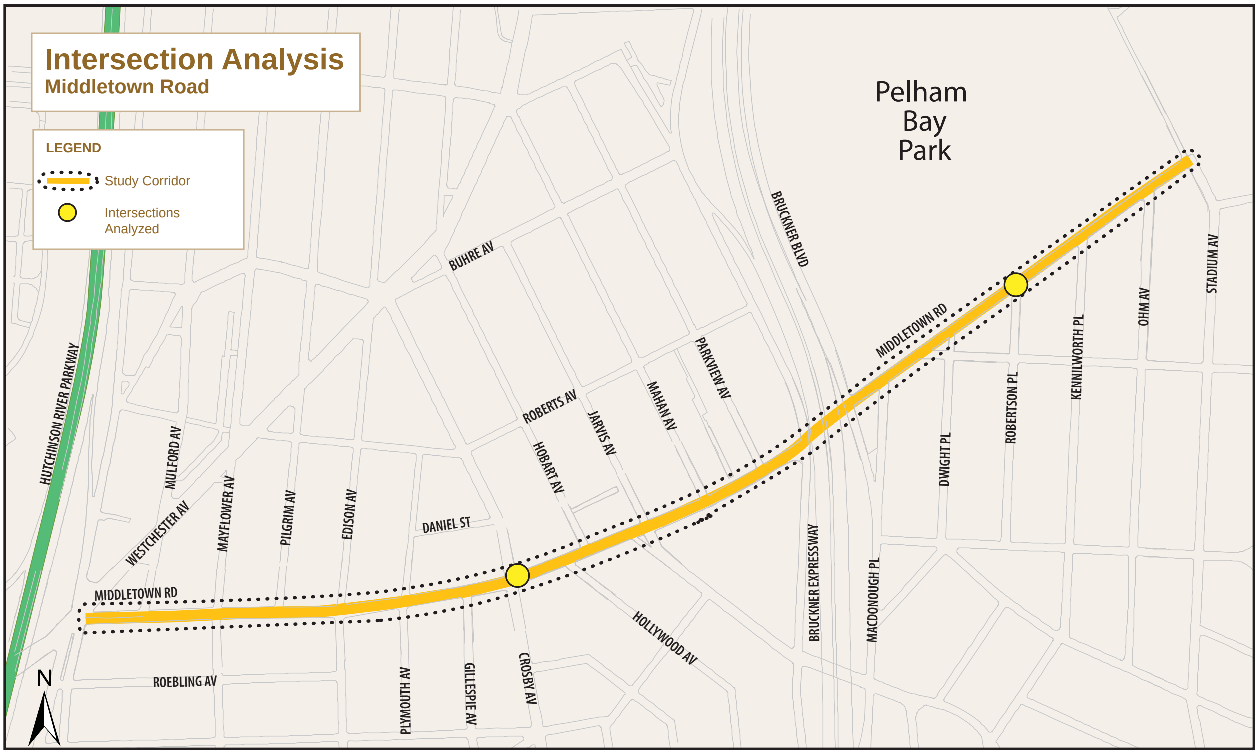


Figure 4.2

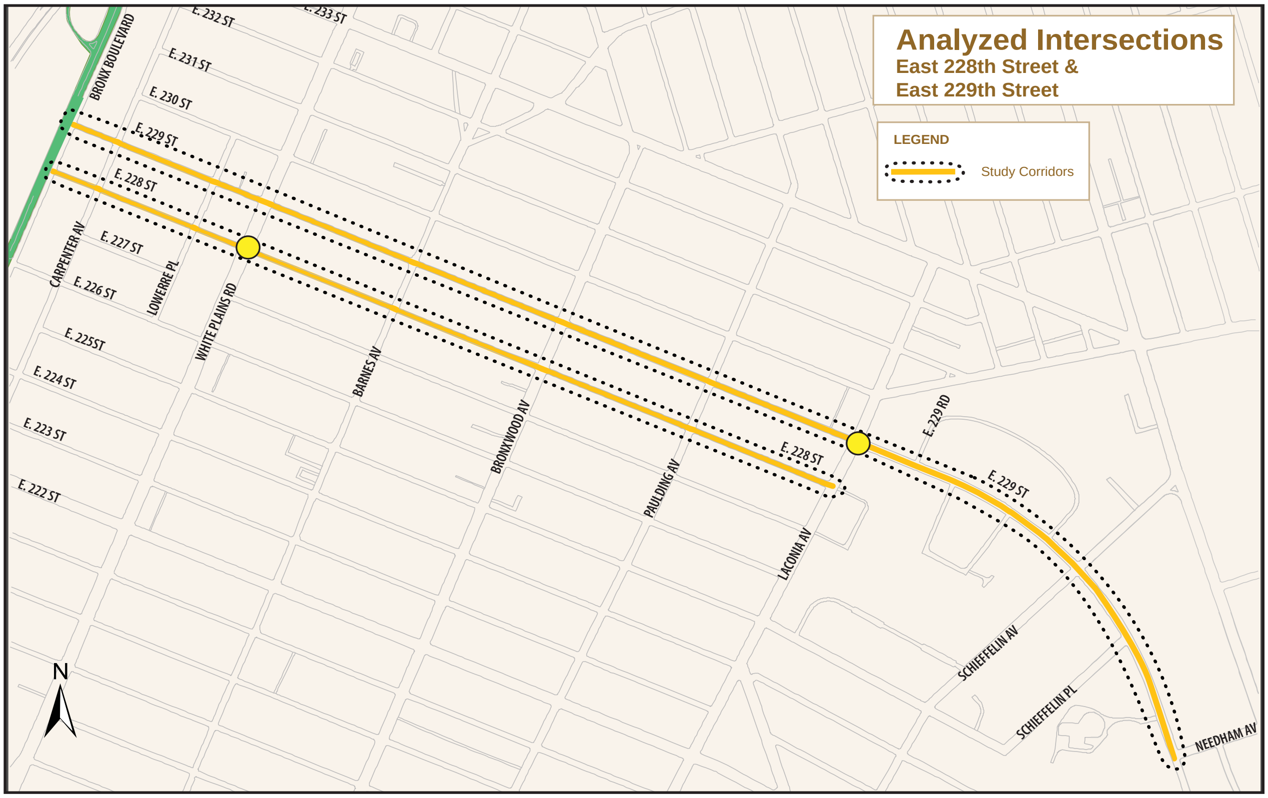
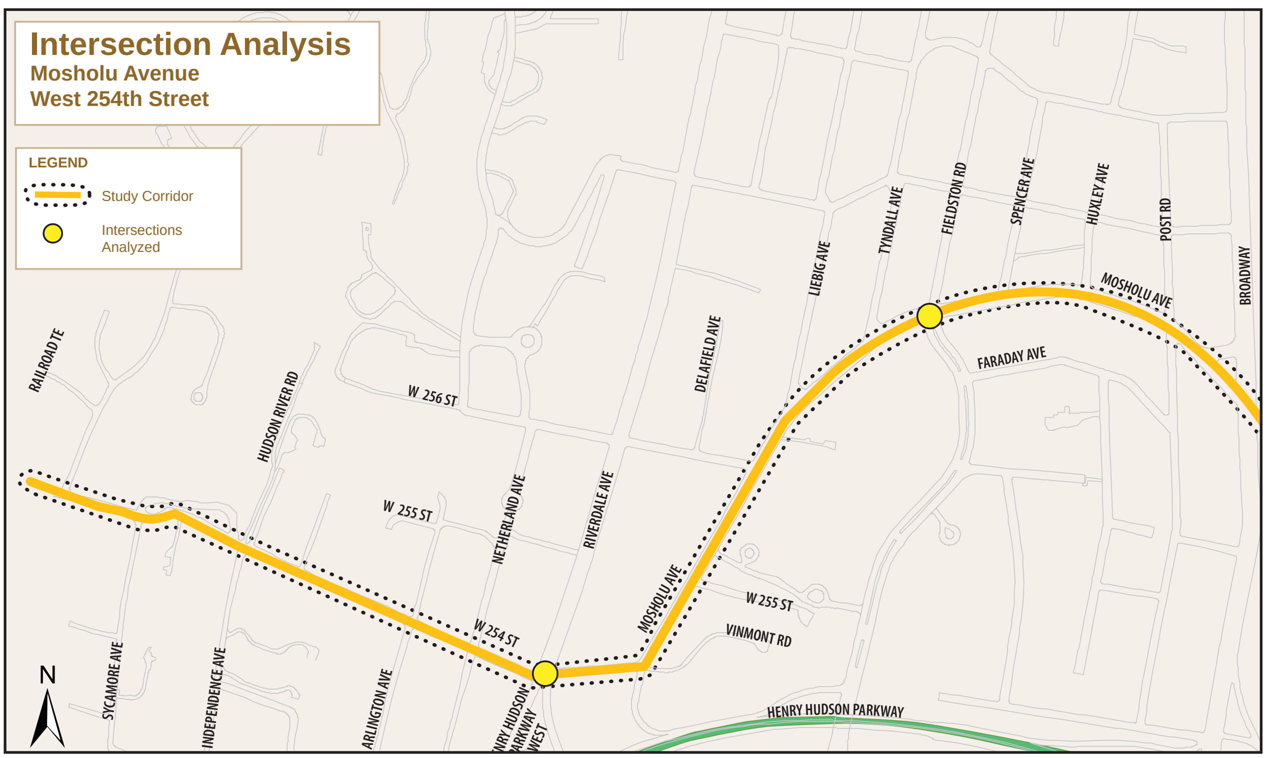


Figure 4.3



Existing Level of Service Conditions
The traffic analysis for this study focused on the peak hour of traffic volume. The peak hour typically represents the most critical period of operation and has the highest capacity requirements.

Traffic volume, turning movement, and vehicle classification counts were performed during the weekday morning, midday, and evening within the study area. The peak hour was identified as 7:45 to 8:45AM for the morning period, 12:15 to 1:15PM for the midday period and 5:00 to 6:00PM for the evening period. Tables 4.3 and 4.4 present the existing LOS conditions for the selected signalized and un-signalized intersections within the study area.

Table 4.3
2007 Existing Conditions - Signalized Intersections

		AM			Midday			PM		
Intersection	**Approach**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
Mosholu Av & Fieldston Rd	Eastbound LTR	0.38	9.2	A	0.25	8.1	A	0.29	8.3	A
	Westbound LTR	0.17	7.6	A	0.18	7.5	A	0.22	7.7	A
	Northbound LTR	0.29	16.0	B	0.24	15.4	B	0.34	16.5	B
	Southbound LTR	0.32	16.1	B	0.15	14.3	B	0.14	14.2	B
		Inter.Delay= 11.9 , LOS= B			Inter.Delay= 10.4 , LOS= B			Inter.Delay= 10.9 , LOS= B		
Laconia Av & E. 229th St	Eastbound LTR	0.39	27.9	C	0.25	25.7	C	0.22	25.3	C
	Westbound LR	0.83	50.8	D	0.41	29.0	C	0.46	30.1	C
	Northbound TR	0.21	8.9	A	0.14	8.4	A	0.20	8.8	A
	Southbound LT	0.29	9.6	A	0.17	8.6	A	0.26	9.4	A
		Inter.Delay= 20.9 , LOS= C			Inter.Delay= 15.0 , LOS= B			Inter.Delay= 14.3 , LOS= B		
W. 254th St & Riverdale Av	Eastbound LTR	0.42	14.2	B	0.18	11.2	B	0.32	12.7	B
	Westbound LTR	0.87	31.1	C	0.52	15.7	B	0.48	14.9	B
	Northbound LTR	0.77	21.6	C	0.40	12.8	B	0.47	13.5	B
	Southbound LTR	0.57	14.8	B	0.38	12.5	B	0.50	13.8	B
		Inter.Delay= 20.8 , LOS= C			Inter.Delay= 13.2 , LOS= B			Inter.Delay= 13.8 , LOS= B		
Middletown Rd & Crosby Av	Eastbound LTR	0.48	14.5	B	0.51	14.9	B	0.60	16.7	B
	Westbound LTR	0.65	18.1	B	0.46	14.1	B	0.60	16.7	B
	Northbound LTR	0.61	17.1	B	0.42	13.5	B	0.50	14.7	B
	Southbound LTR	0.36	12.8	B	0.35	12.6	B	0.42	13.4	B
		Inter.Delay= 16.1 , LOS= B			Inter.Delay= 13.9 , LOS= B			Inter.Delay= 15.6 , LOS= B		

Table 4.4
2007 Existing Conditions - Unsignalized Intersections

		AM			Midday			PM		
Intersection	**Appr.**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
E. 228th St &	Eastbound									
White Plains Rd	Westbound									
(2W-STOP)-N/S	LTR	0.27	16.2	C	0.17	16.0	C	0.19	15.4	C
	Northbound									
	LT	0.01	8.1	A	0.02	8.4	A	0.01	8.2	A
	Southbound									
		WB App Delay=16.2, LOS=C								
Roberston Pl &	Eastbound									
Middletown Rd	Westbound									
(2W-STOP)-E/W	LT	0.00	7.8	A	0.00	7.8	A	0.00	7.9	A
	Northbound									
	LR	0.01	11.4	B	0.00	11.0	B	0.01	11.8	B
	Southbound									
		NB App Delay=11.4, LOS=B								

The existing traffic volumes for weekday morning, midday, and evening peak hours are presented in Figures 4.4, 4.5 and 4.6, respectively on the following pages. Data was collected by Transportation Division Staff on June 12, 2007. For each signalized intersection, the signal timing, cycle length, and phasing were obtained from the New York City Department of Transportation (NYCDOT).

The HCM summary sheets, which document the existing signal timing, phasing, allowed traffic movements, traffic volumes, peak hour factors, percent of heavy vehicles, LOS by approach, and LOS for the entire intersection, are on file at the NYCDCP.

The capacity analysis indicates that all intersections operate at acceptable levels of service with LOS C or better for all peak periods. Based on this analysis Transportation Division staff has determined that all of the corridors are suitable for cyclists.

Figure 4.4

Existing AM Traffic Volumes for Intersections Analyzed

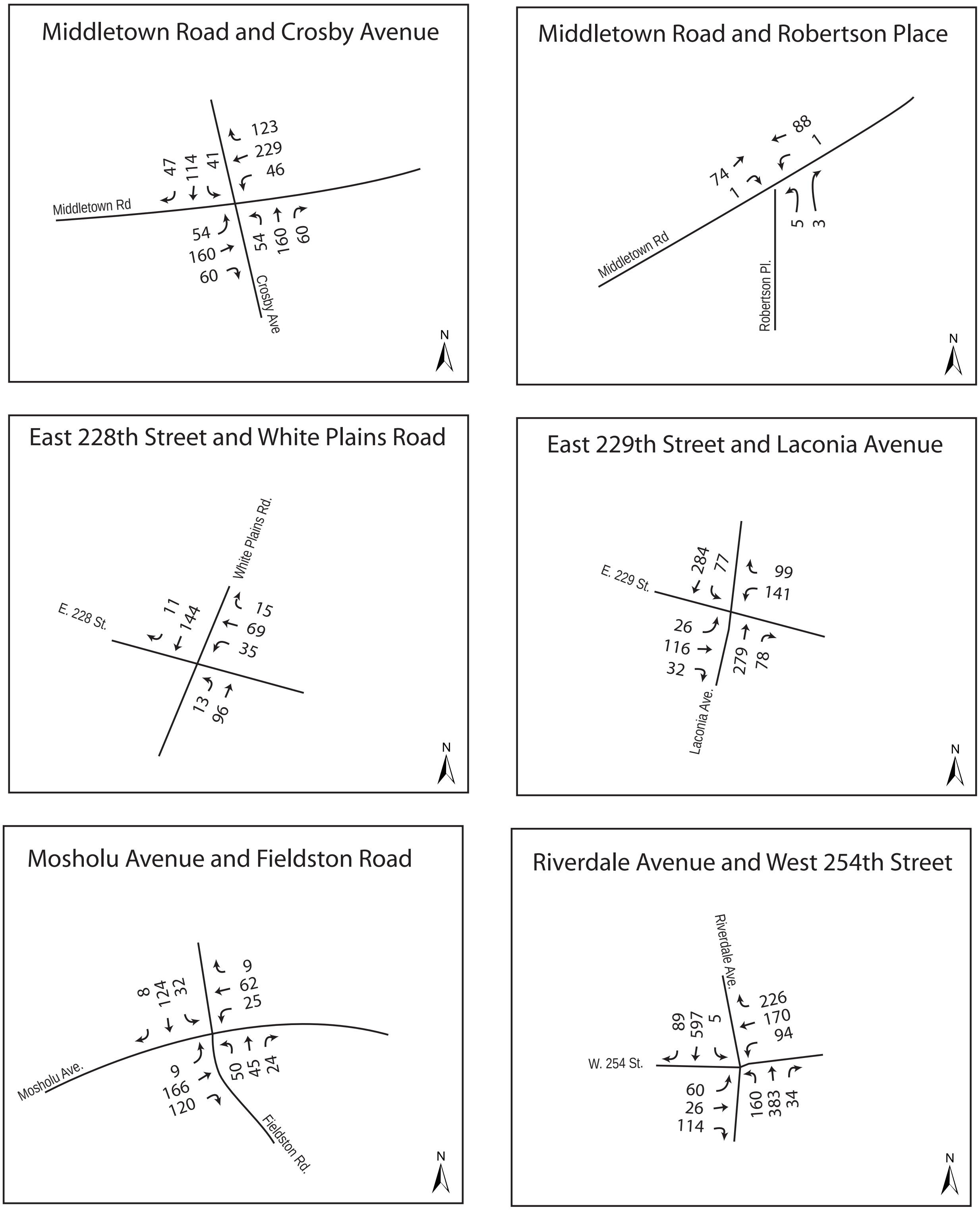
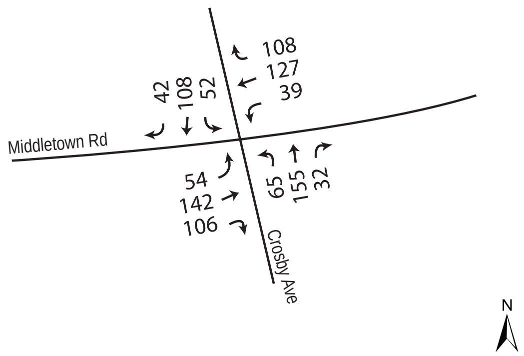


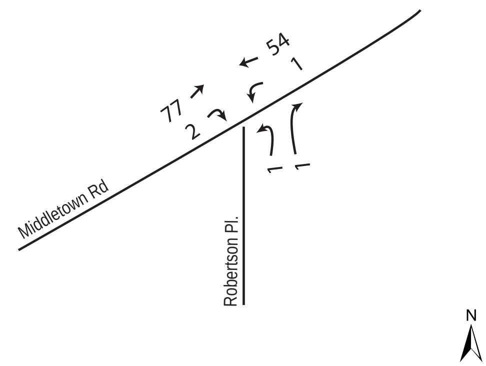
Figure 4.5

Existing Midday Traffic Volumes for Intersections Analyzed

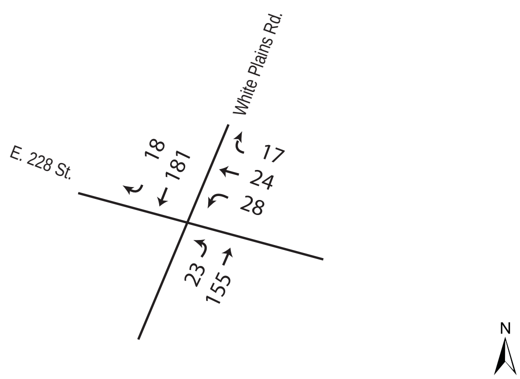
Middletown Road and Crosby Avenue



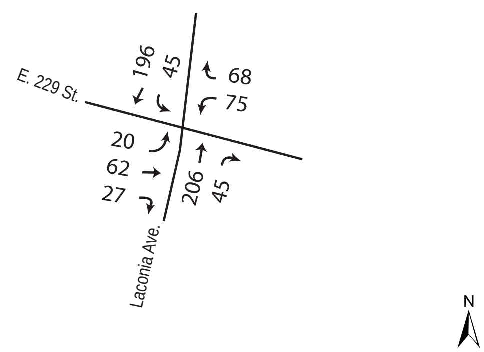
Middletown Road and Robertson Place



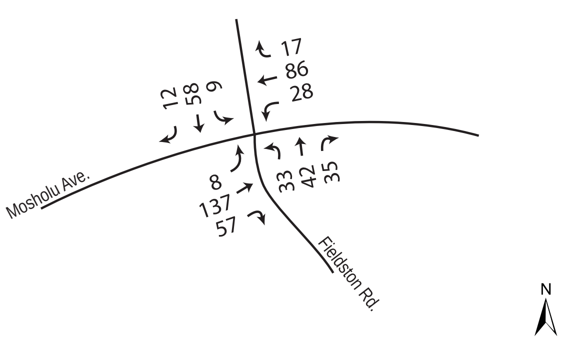
East 228th Street and White Plains Road



East 229th Street and Laconia Avenue



Mosholu Avenue and Fieldston Road



Riverdale Avenue and West 254th Street

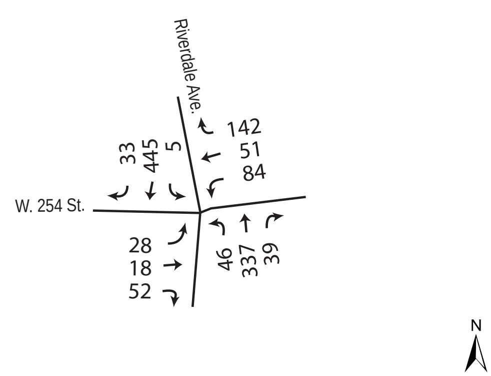
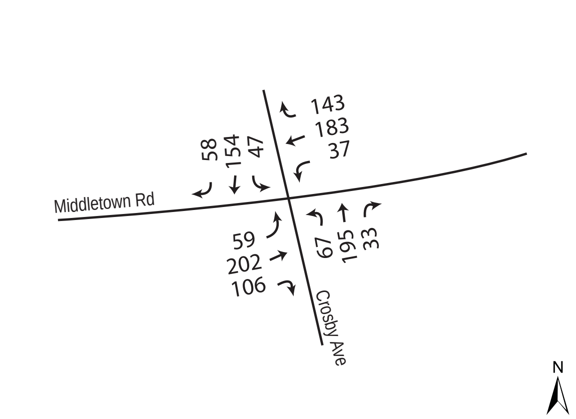


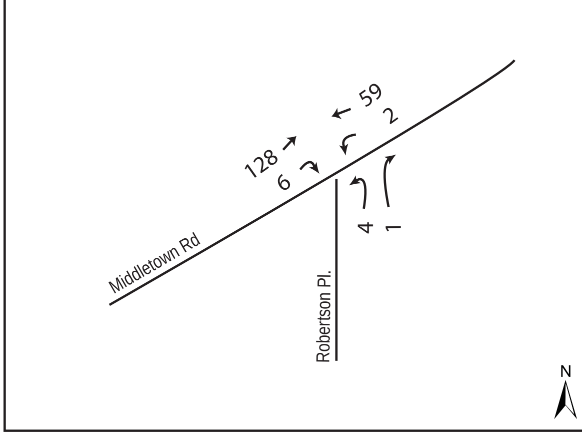
Figure 4.6

Existing PM Traffic Volumes for Intersections Analyzed

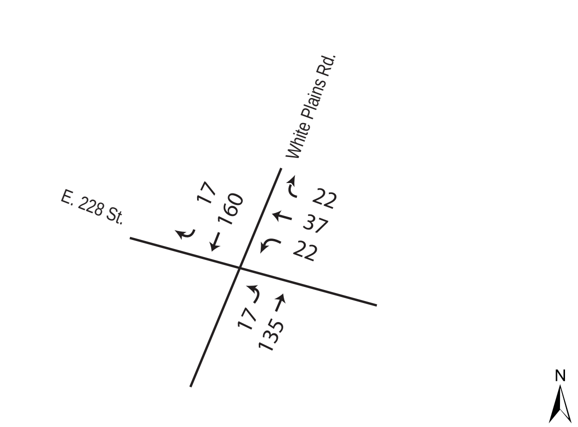
Middletown Road and Crosby Avenue



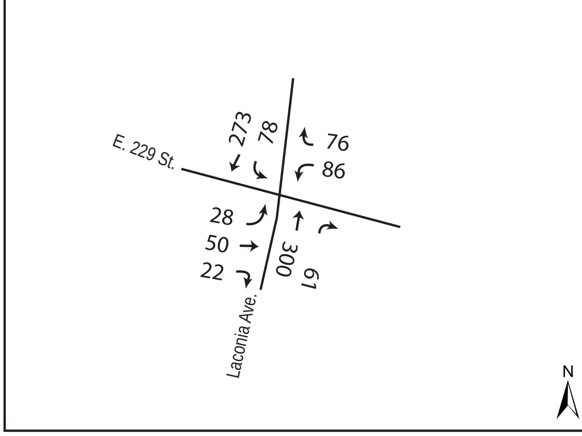
Middletown Road and Robertson Place



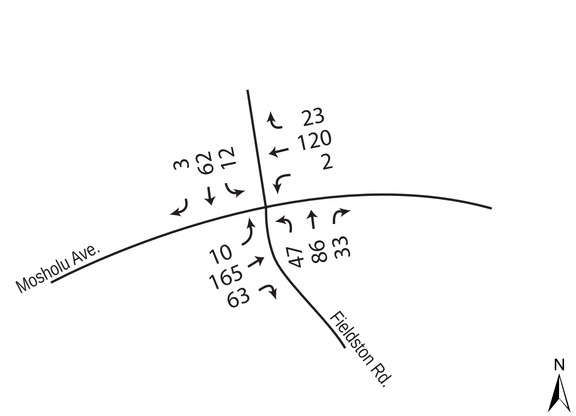
East 228th Street and White Plains Road



East 229th Street and Laconia Avenue



Mosholu Avenue and Fieldston Road



Riverdale Avenue and West 254th Street